

## Remarks

By this Amendment, Applicants have withdrawn claim 23. Therefore, claims 21, 22, 24-26, and 29-40 are currently pending. The Examiner's comments and rejections in the Office Action mailed on May 9, 2005 are addressed below in the order presented in the Office Action.

### **I. Withdrawal of Claim 23**

The Examiner has maintained that claim 23 is directed to a non-elected species. Applicants by this Amendment have withdrawn claim 23.

### **II. Rejections Under 35 U.S.C. § 112**

The Examiner has rejected claims 21, 22, 24-26, and 29-40 under 35 U.S.C. § 112, second paragraph, as failing to point out and distinctly claim the subject matter that Applicants regard as the invention. Specifically, the Examiner has rejected independent claims 21 and 37 based upon the limitation of "a length at least as long as the irradiated nuclear fuel assembly" and stating that "there is not a unique length of an irradiated fuel assembly because there is a plurality of types of fuel assemblies". The Examiner rejected independent claims 31 and 37 based upon the limitation that the node structure is "an approximate multiple of said spacing between each of said fuel rods" and stating that "there is not one unique spacing of fuel rods for all types of fuel assemblies". Lastly, the Examiner has rejected independent claim 34 based upon the claim limitation that at least one plurality of ultrasonic transducers are "adjacent to a first one of said four sides of said irradiated nuclear fuel assembly" and stating that not all irradiated fuel assemblies have so-called "sides".

Applicants traverse these rejections. Following is a discussion of applicable legal precedent regarding indefiniteness, which dictates that a claim element, including its dimensions, can be recited in terms of the environment in which it will be used, such as in relation to other pieces of equipment that may be used in conjunction with that claim element. The rejections as to claims 21, 31, and 37 are then addressed. Lastly, the rejection of claim 34 is addressed.

### Legal Background

The fact that claims recite an element that refers to the context in which the invention will be used (in this case, the nuclear fuel assembly in independent claims 21 and 37 and the spacing of the nuclear fuel assembly rods in independent claims 31 and 37) or that its dimensions are defined by reference to its environment is not a basis for an indefiniteness rejection. *See Moore U.S.A., Inc. v. Standard Register Company*, 299 F.3d 1091, 1111 (Fed. Cir. 2000) (stating, in the context of analyzing an indefiniteness rejection regarding the term “distance sufficient”, “there is nothing wrong with defining the dimensions of a device in terms of the environment in which it is to be used” and noting the examiner’s acceptance of the term “distance sufficient” as definite, citing to *Orthokinetics, Inc. v. Safety Travel Chairs, Inc.*, 806 F.2d 1565, 1575-76 (Fed. Cir. 1986)).

Further, the fact that a claim refers to its *intended or desired* use in conjunction with another piece of equipment (again, in this case, the use with various types of nuclear fuel assemblies and the use with various spacing of fuel rods) and is even specifically defined by dimensions of such other pieces of equipment does not render the claim indefinite. *See Orthokinetics*, 806 F.2d at 1576 (stating that the claims to a travel chair were intended to cover the use of the invention with various types of automobiles and holding that the phrase “so dimensioned as to be insertable through the space between the doorframe of an automobile and one of the seats thereof” is “as accurate as the subject matter permits, automobiles being of various sizes. As long as those of ordinary skill in the art realized that the dimensions could be easily obtained, § 112, 2d ¶ requires nothing more. The patent law does not require that all possible lengths corresponding to the spaces in hundreds of different automobiles be listed in the patent, let alone that they be listed in the claims.”)

### Rejection of Claims 21, 31, and 37

As the preceding cases illustrate, claim elements may be defined by reference to the environment in which they will be used. Claims 21, 31, and 37 refer to certain aspects of the environment in which they will be used. Claims 21 and 37 refer to a nuclear fuel assembly, and claims 31 and 37 refer to the spacing of the rods in a nuclear fuel assembly. More specifically, the dimensions of certain elements of these claims are determined by reference to the environment in which they will be used (*i.e.*, by reference to the nuclear fuel assembly and the rod spacing). This is exactly what *Moore* held was appropriate and not indefinite since “there is nothing wrong with defining the dimensions of a device in terms of the environment in which it is to be used” (*Moore* 299 F.3d at 1111).

Moreover, *Orthokinetics* held that as long as one of ordinary skill in the art realized that the dimensions could easily be obtained (in that case for *hundreds* of automobiles) the reference to a dimension relative to the device or article in which the invention would be used was not indefinite. The “length” recited in claims 21 and 37 and the spacing between fuel rods recited in claim 31 are similarly easily understood by one of ordinary skill in the art, who would be knowledgeable about the various types of nuclear fuel assemblies and who would realize that such dimensions are easily obtained. As stated in *Orthokinetics*, “The patent law does not require that all possible lengths corresponding to the spaces in hundreds of different automobiles be listed in the patent, let alone that they be listed in the claims.” *Orthokinetics* 806 F.2d at 1576. Here too, Applicants should not be required to recite all lengths and fuel rod spacings for all nuclear fuel assemblies. Therefore, Applicants request the withdrawal of these rejections.

#### Rejection of Claim 34

The Examiner bases the rejection of claim 34 on the recitation that at least one ultrasonic transducer is “adjacent to a first one of said four sides of said irradiated nuclear fuel assembly” and stating that not all irradiated fuel assemblies have so-called “sides”. As discussed above in connection with claims 21, 31 and 37, claims are not indefinite by virtue of the fact that they recite to the environment in which they are intended to be used. The first element of claim 34 does just that by reciting “an elongated housing configured to receive *an irradiated nuclear fuel assembly having at least four sides*” (emphasis added). While the apparatus of claim 34 could certainly accept a nuclear fuel assembly that does not have four sides, such does not make the claim indefinite. One of ordinary skill in the art would clearly appreciate that the recited orientation of the transducers is simply relative to a four-sided nuclear fuel assembly. In other words, the transducers are positioned on the elongated housing such that *if* a fuel assembly having four sides were used there would be at least one transducer adjacent to each of the four sides. That orientation of transducers is simply recited relative to a four-sided nuclear fuel assembly, which is clearly permissible under *Moore* and *Orthokinetics*. Therefore, Applicants request withdrawal of this rejection.

### **III. Rejections Under 35 U.S.C. § 102**

The Examiner has rejected claims 21, 22, 24, 29, 31, 32, and 37-39 under 35 U.S.C. § 102(b) as being anticipated by EP 0418722 A1 (“Fiorenzo”). Applicants respectfully traverse this rejection.

Fiorenzo describes a process for total decontamination or decommissioning of heat exchanger tubes that have been exposed to radioactive material—not nuclear fuel assemblies. More specifically, Fiorenzo’s process is directed to cleaning of such tubes so that they can be delivered to a permanent storage facility and not re-used. See Fiorenzo at col. 1, ll. 1-23. Accordingly, Fiorenzo’s process is intended to provide as thorough a cleaning as possible, since it is desirable to reduce or eliminate as much of the radioactive material as possible prior to permanent storage or disposal. To provide such maximum cleaning efficiency in the apparatus taught by Fiorenzo, ultrasonic energy is applied so as to convey the maximum amount of ultrasonic energy to the tubes. Fiorenzo’s process would not utilize an inefficient application of ultrasonic energy, again, because Fiorenzo’s process is directed to providing a maximum amount of cleaning of radioactive materials. (Even assuming, *arguendo*, that Fiorenzo applies to the cleaning of nuclear fuel assemblies, Fiorenzo’s process is performed without regard for the integrity of the fuel pellets. In the case where the fuel rods may be re-used, ultrasonic energy must be used in such a manner to avoid damaging the fuel pellets. In other words, applying a maximum amount of ultrasonic energy to provide maximum cleaning would most likely result in damage to the fuel pellets, thereby precluding their re-use. In Fiorenzo’s process, since the heat exchanger tubes are not going to be re-used, a maximum amount of ultrasonic energy is used to provide maximum cleaning. Therefore, Fiorenzo is interested in conveying all of the ultrasonic energy from the transducers to the cleaning process and would not be interested in inefficient application of transducer energy.)

Fiorenzo’s process utilizes a tank within a tank, wherein the tubes are inserted into the inner tank. The inner tank contains wash water and the outer tank contains a liquid solution used to maintain the temperature of the wash water in the inner tank. The transducers are attached to the outer side walls and the bottom of the outer tank. The ultrasonic energy is then conveyed through the outer tank walls to the liquid solution between the tanks to the walls of the inner tank and finally to the wash water inside the inner tank. To provide the maximum and most efficient application of ultrasonic energy to the tubes, the transducers are attached directly to the outer tank walls, and the ultrasonic energy is sent in one direction—toward the inside of the tank. To accomplish an efficient attachment to the wall of the tank and to direct the ultrasonic energy in a single direction toward the center of the tank requires the use of a planar transducer, not an omnidirectional transducer that provides energy in multiple directions. In fact, the use of omnidirectional transducers in the apparatus taught by

Fiorenzo would be very inefficient, thereby minimizing the maximum cleaning desired. Therefore, Fiorenzo does not teach or suggest the use of omnidirectional transducers.

The Examiner notes Fiorenzo's use of the units of W/l as indicative of omnidirectional transducers, particularly when coupled with the previously submitted Declaration of David Gross, which stated that such units are indicative of omnidirectional transducers. However, the use of these units in Fiorenzo is clearly in the context of describing the power density in the overall wash water of the inner tank and not in the context of the type of transducer being used on the outside of a completely separate tank (*i.e.*, the outer tank). Fiorenzo states “An assembly of ultrasound emitting piezoelectric transducers . . . being of such specification and number *as to maintain* in the inner tank 5A *a homogeneous power density . . .*” Fiorenzo at col. 2, ll. 40-45 (emphasis added). In the apparatus of Fiorenzo, the energy is being directed to a pool of water held within the inner tank that is completely separate from the origin of the energy. Because of this separation between the desired power density in the inner tank where the actual cleaning occurs and the outer tank to which the transducers are attached and from which the ultrasound originates, it only makes sense to discuss the energy where the cleaning takes place in terms of power per volume or W/l. This is supported by Fiorenzo's use of the term “homogeneous” to convey that regardless of how the power is generated, the more important aspect is the power density in the wash water in the inner tank, which again is simply described in terms of power per volume because it is the power in that volume of water that is important—regardless of the type of transducer used to provide ultrasonic energy to a separate outer tank. The use of such units in this context is not an indication of the type of transducer being used. If Fiorenzo were discussing the energy to be applied to the wall of the outer tank from the transducers, it is most likely that such would be done using terms or units associated with planar transducers.

Moreover, the Declaration of David Gross did not state that every use of power density units of W/l means that the source of such power density is from an omnidirectional transducer. The Declaration in discussing the Kato reference stated that Kato referred to transducer energy in terms indicative of planar transducers and further stated that omnidirectional transducers are typically described in terms of power per unit volume. Fiorenzo, however, is not discussing transducer energy. Rather, Fiorenzo is discussing the desired or resulting power density in the wash water. Therefore, Fiorenzo's use of W/l

cannot be deemed to be a teaching of omnidirectional transducers, particularly given the context in which such units are used in Fiorenzo.

As for the claim limitations regarding the node structure, Fiorenzo does not teach or suggest omnidirectional ultrasonic energy waves having a node structure that is an approximate multiple of said spacing between each of said fuel rods as recited in independent claims 31 and 37. The Examiner states that “absent the definition or specification of the spacing of the fuel rods, the omnidirectional waves produced by the transducers of Fiorenzo read on the claims.” First, this position relies upon the assumption that the transducers taught by Fiorenzo are omnidirectional—as discussed above, they are not. Second, as also discussed above, the claims do not need to recite or specify the exact definition of the fuel rod spacing. Third, Fiorenzo does not teach or suggest anything about the node structure of the transducers used relative to nuclear fuel rod spacing. Fiorenzo is concerned with heat exchanger tubes; consequently there is no teaching regarding spacing between fuel rods. In fact, Fiorenzo does not even teach or suggest any use of transducer node structures relative to the heat exchanger tubes.

Based on the above, Fiorenzo does not teach or suggest the use of omnidirectional transducers as recited in independent claims 21, 31, and 37 and their corresponding dependent claims, nor does Fiorenzo teach or suggest the node structure recited in claims 31 and 37 and their corresponding dependent claims. For these reasons, Applicants request withdrawal of this rejection.

#### **IV. Rejections Under 35 U.S.C. § 103**

##### **Rejection of Claims 25 and 26**

The Examiner has rejected claims 25 and 26 under 35 U.S.C. § 103(a) as being unpatentable over Fiorenzo in view of U.S. Patent No. 5, 200,666 (“Walter”). Applicants respectfully traverse this rejection.

Based on Applicant’s arguments above in connection with the rejection of independent claim 21 under 35 U.S.C. § 102(b), from which claims 25 and 26 depend, Applicants submit that these dependent claims are patentable. Therefore, Applicants request withdrawal of this rejection on this basis alone.

In addition, Applicants submit that one of skill in the art would not be motivated to substitute the transducers of Fiorenzo with those taught by Walter. As discussed above, Fiorenzo needs transducers that transmit energy in a single direction toward the inner tank.

The use of the transducers taught by Walter would result in inefficient use of the transducer energy since not all of the transducer energy would be directed appropriately toward the inner tank. Therefore, one of skill in the art would not be motivated to combine these references or have an expectation of success in their combination. The Examiner has not made a *prima facie* case of obviousness in this combination of references, and Applicants request withdrawal of this rejection.

Rejection of Claims 30, 33, and 40

The Examiner has rejected claims 30, 33, and 40 under 35 U.S.C. § 103(a) as being unpatentable over Fiorenzo in view of the combination of U.S. Patent No. 5,467,791 (“Kato”) and U.S. Patent No. 5,377,237 (“Richardson”). Applicants respectfully traverse this rejection.

Based on Applicant’s arguments above in connection with the rejection of independent claims 21, 31, and 37 under 35 U.S.C. § 102(b), from which claims 30, 33 and 40 depend, respectively, Applicants submit that these dependent claims are patentable. Therefore, Applicants request withdrawal of this rejection.

Rejection of Claims 34-36

The Examiner has rejected claims 34-36 under 35 U.S.C. § 103(a) as being unpatentable over Fiorenzo in view of the combination of U.S. Patent No. 4,320,528 (“Scharton”), Kato, and Richardson. Applicants respectfully traverse this rejection.

Applicants submit that the Examiner has not made a *prima facie* case of obviousness. First, for the same reasons given above in connection with the traversal of the rejection of claims 21, 31, and 37 under 35 U.S.C. § 102(b), Fiorenzo does not teach or suggest a omnidirectional transducer as recited in independent claim 34 and dependent claims 35 and 36.

In addition, the Examiner states that it would be obvious to move the transducers in Fiorenzo from the outside wall of the outer tank to inside the inner tank based upon the teaching of Scharton. To the contrary, Scharton teaches the placement of the transducers on either the inside or outside of a single tank containing the heat exchangers to be cleaned. Notwithstanding the fact that Scharton applies to cleaning of heat exchangers as opposed to nuclear fuel assemblies, the teaching of Scharton, at best, would only result in placing the transducers of Fiorenzo on the inside wall of the outer tank and not adjacent to any given wall of a nuclear fuel assembly. There is no teaching or suggest provided to motivate one of skill in the art to move the transducers of Fiorenzo to the inside wall of the inner tank. Moreover,

Scharton does not address the cleaning of nuclear fuel assemblies and, therefore, one of skill in the art would not combine its teachings with those of Fiorenzo.

In addition, the Examiner states that to produce the homogenous power density recited in Fiorenzo it would be inherent to have transducers evenly spaced from each other around the periphery of the tank. However, the Examiner has not shown any support for this conclusion, particularly in light of the fact that Fiorenzo teaches the placement of transducers on the bottom of the tank, which would also add to the generation of the homogenous power density. Therefore, Applicants request withdrawal of this rejection.

**V. Conclusion**

In view of the above considerations, Applicants respectfully request a timely Notice of Allowance in this application. The Examiner is invited to call the undersigned attorney if a telephone call could help resolve any remaining items.

At this time, Applicants believe that no other fees are due other than those authorized in the concurrent submissions herewith, such as the Request for Extension of Time. However, please charge any additional required fee to Morgan, Lewis & Bockius LLP Deposit Account No. 50-0310 (order no. 060825-0306 US). A copy of this sheet is enclosed for this purpose.

Date: September 23, 2005 By:

Respectfully submitted,



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